March 2, 1971 D. A. WOLF 3,567,250

BICYCLE WITH IMPROVED BRAKE SYSTEM

Filed March 12, 1969 2 Sheets-Sheet 1

FIG-1

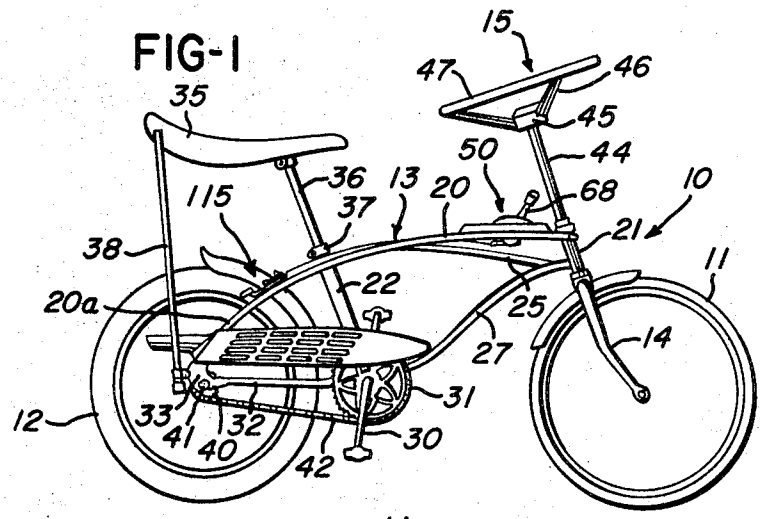


FIG-2

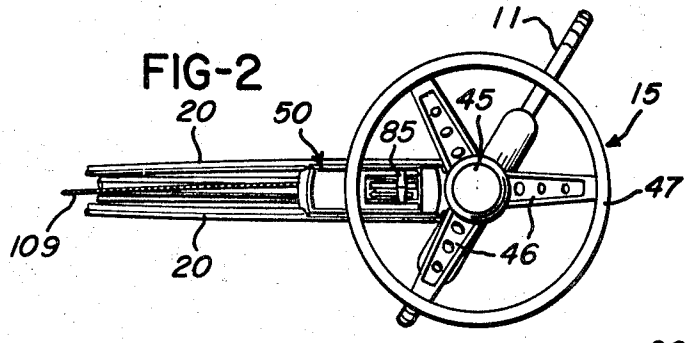


FIG-4

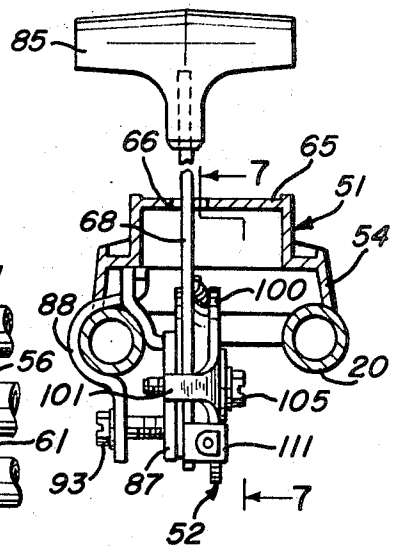


FIG-3

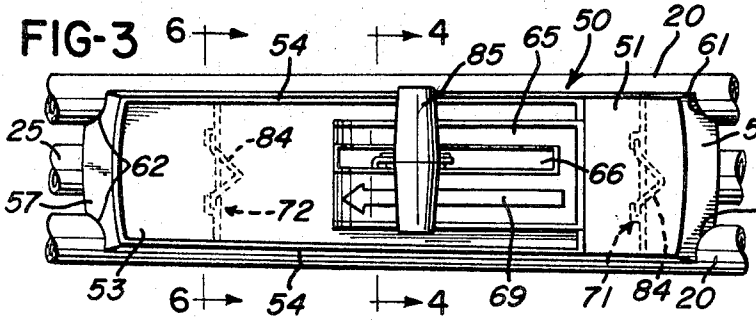


FIG-5

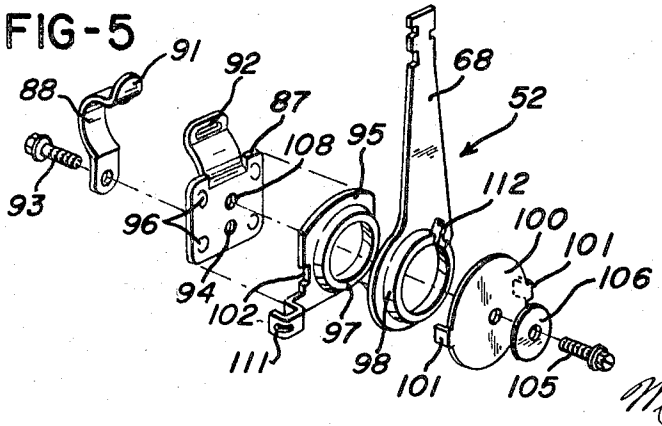
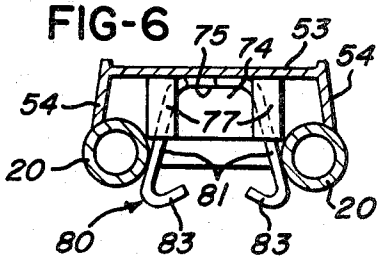


FIG-6



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March 2, 1971 D. A. WOLF 3,567,250

BICYCLE WITH IMPROVED BRAKE SYSTEM

Filed March 12, 1969 2 Sheets-Sheet 2

FIG-7

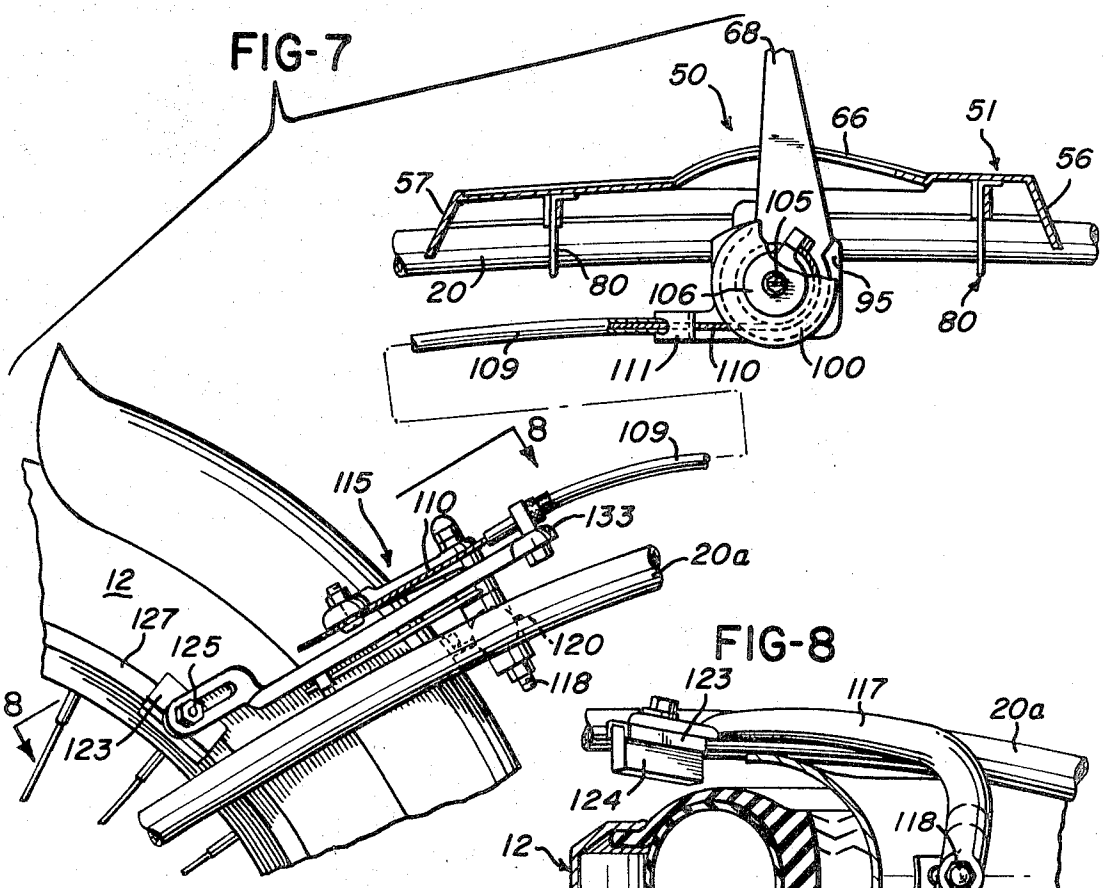


FIG-8

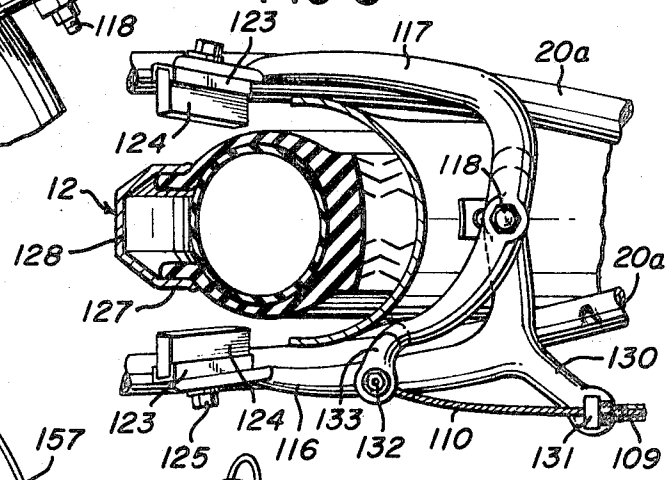
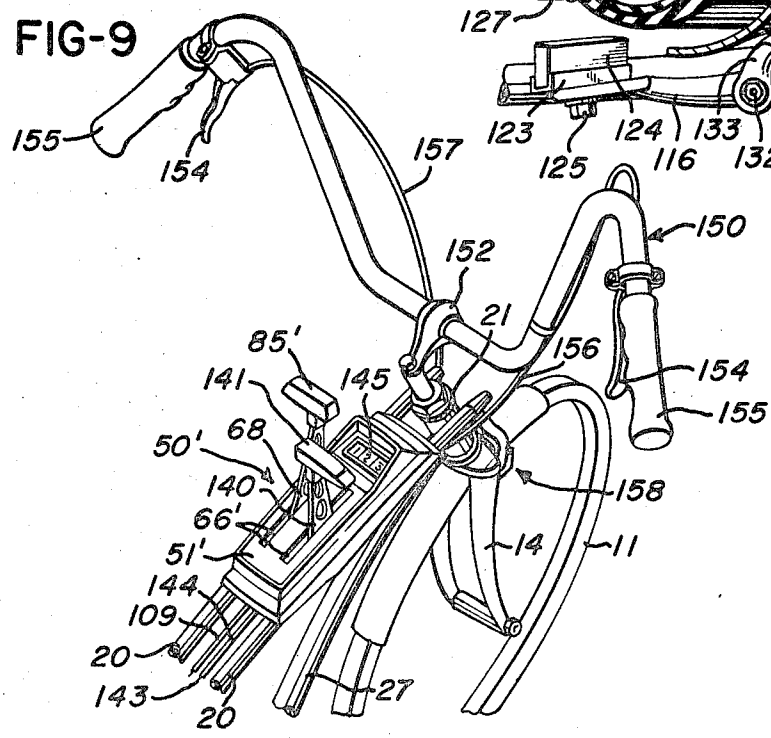


FIG-9



United States Patent Office 3,567,250 Patented Mar. 2, 1971

3,567,250

BICYCLE WITH IMPROVED BRAKE SYSTEM

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U.S. Cl. 280—289 6 Claims

ABSTRACT OF THE DISCLOSURE

A bicycle has a brake actuator including a housing mounted on twin upper tubes of the frame below an automotive type steering wheel or a handlebar. A pivotable lever is supported by the housing between the tubes and is connected by a shielded cable to caliper brakes for the rear wheel of the bicycle. The lever is effective to lock the rear wheel against rotation for providing a parking brake. The housing may also support a second pivotable lever connected to actuate a speed change mechanism.

BACKGROUND OF THE INVENTION

In a standard bicycle, the conventional handlebar is suitably deformed so that the handle grips are properly located to receive the hands of the rider for steering the bicycle. Commonly, brake actuator handles are pivotally mounted on the handlebar adjacent the handle grips so that the rider can conveniently place each hand simultaneously on both a handle grip and the adjacent brake handle.

When an automotive-type wheel is used on a bicycle instead of a handlebar, the conventional brake actuator handles are unsuitable because the handles cannot be conveniently actuated, and the operating wires or cables extending from the actuator handles interfere with full rotation of the steering wheel. Furthermore, when the pressure on each actuating handle is released, the corresponding brake is released. This is necessary since the gripping manner in which a rider's hand grasps both the handle grip and the brake actuating handle does not permit the brake operating mechanism to be manually moved to its released position. Thus this type of braking mechanism cannot function to lock the brakes in their braking positions and thereby provide a parking brake.

SUMMARY OF THE INVENTION

The present invention is directed to a bicycle which includes an improved wheel brake system. In accordance with one embodiment of the invention, a bicycle has an automotive-type steering wheel which enables the operator to turn the front wheel through 360°. A brake actuator includes a housing which is mounted on twin upper tubes of the bicycle frame below the rear portion of the steering wheel, and the housing supports a pivotable lever connected by a cable to caliper brakes for the rear wheel. The actuating lever must be positively moved manually between its alternate braking and release positions. In accordance with another embodiment, the brake actuator housing also supports a second pivotable lever which may be connected to a speed change mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of the bicycle constructed in accordance with the invention;

FIG. 2 is a plan view of the front portion of the bicycle shown in FIG. 1;

FIG. 3 is a fragmentary plan view of the brake actuator;

FIG. 4 is a section taken generally on the line 4—4 of FIG. 3;

FIG. 5 is a fragmentary exploded perspective view of the brake actuator assembly;

FIG. 6 is a section taken generally on the line 6—6 of FIG. 3;

FIG. 7 is a section taken generally on the line 7—7 of FIG. 4 and also illustrating a caliper brake mechanism for the rear wheel;

FIG. 8 is a section taken generally on the line 8—8 of FIG. 7; and

FIG. 9 is a fragmentary perspective view showing a modification of a bicycle constructed in accordance with the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, the bicycle **10** includes front and rear wheels **11** and **12** which support a frame **13** in the usual manner. The front fork **14** supports the front wheel **11** for turning movement which is supplied by a round automotive-type steering wheel **15** disposed above the front wheel **11** for rotating the fork **14** through 360°. The frame **13** includes a pair of generally parallel upper tubes **20** which extend rearwardly from a welded tangential connection with the front fork mast **21** to a similar connection with the generally vertically disposed seat mast **22**.

An upper truss tube **25** is secured near the forward end of a lower tube **27** and extends rearwardly between the parallel tubes **20** and is welded to the upper portion of the seat mast **22**. The rear end portion of the lower tube **27** is secured to a tubular sprocket housing (not shown) which supports a crank **30** and a large crank sprocket **31** in the usual manner. A pair of horizontal tubes **32** extend from rigid connections with the sprocket housing to engagement with corresponding rear axle plates **33** which are also welded to rear sections **20***a* of the tubes **20** to complete the rear fork which supports the rear wheel **12**.

An elongated "banana" type seat **35** has its forward end supported by a seat post **36** which is received within the seat mast **22** and is clamped in position by the collar **37**. The rear portion of the seat **35** is supported by parallel braces **38** which extend downwardly and are secured to the ends of the rear fork members **20***a*. A conventional rear hub assembly includes a drive sprocket **40** mounted on the rear axle **41** and driven by a chain **42** extending from the crank sprocket **31**.

The automotive-type steering wheel **15** includes a hub portion **45** which is mounted on the upper end of an elongated stem **44** connected to the fork **14** within the mast **21**. Three spoke members **46** extend outwardly and upwardly from the hub portion **45** and support a circular rim or hand portion **47**. The steering wheel **15** is preferably made of plastic material having metal components which internally support and reinforce the plastic material.

In accordance with the invention, a brake console or actuator **50** includes a housing **51** and a brake actuator assembly **52** for operating the brakes. The housing **51**, as shown in FIGS. 3–8, may be constructed of a rigid plastic material and includes a relatively flat top wall **53** (FIG. 6) connecting downwardly extending side walls **54** formed integrally therewith. Front and rear end walls **56** and **57**, respectively, taper downwardly (FIG. 3) from integral connections to the top and side walls **53** and **54**.

Circular cutouts **61** and **62** are provided at the lower corners of each of the end walls **56** and **57**, respectively, and have a diameter substantially equal to the outer diameter of the parallel tubes **20**. The centers of these cutouts are spaced apart a distance equal to the distance between the centerlines of the parallel tubes **20** so that the tubes **20** receive the housing **51** in the manner shown in FIG. 4 wherein the lower edges **64** of the side walls **54** engage the top surface of the tubes **20** and the edges of the cutouts **61** and **62** intimately seat on the tubes.

A rounded or curved projection **65** is formed centrally within the top wall **53** and has a slot **66** therein. A brake member or lever **68** extends upwardly through the slot **66** and indicia in the form of an arrow **69**, is provided on the top surface of the projection to indicate the condition of the brake lever **68**, as will be described.

Positioned within the housing **51** are front and rear connectors **71** and **72** (FIG. 3) which secure the housing securely in position on the tubes **20**. Each of the connectors **71** and **72** include a downwardly extending transverse partition **74** which is integrally formed with the top and side walls **53** and **54** (FIG. 6). A horizontal slot **75** (FIG. 6) is formed within the upper central portion of each partition adjacent the top wall **53**, and a pair of inwardly extending flanges **77** are spaced from each partition **74** to define a pair of opposing grooves.

The connectors **71** and **72** each include an inverted generally U-shaped wire **80** having leg portions **81** with their lower ends **83** curved inwardly, and a horizontal extending upper loop **84** (FIG. 3) is formed within the upper central portion of each wire. To install each wire **80**, the leg portions **81** are pinched or forced together and the upper loop **84** is inserted into the slot **75** within the corresponding partition **74**. The leg portions **81** are then released so that they expand into the grooves defined between the partition **74** and the flanges **77**. When the actuator **50** is placed on the parallel upper tubes **20**, the leg portions **81** are forced or cammed together and then move outwardly where the ends **83** provide pressure engagement against the tubes **20** to hold the housing **51** firmly in position.

The brake actuating assembly **52** is shown in FIGS. 4 and 5 and includes a brake actuating lever **68** having a T-shaped handle **85** secured to the top end thereof. The assembly also includes a mounting bracket **87** which is clamped to the left tube **20** by a bracket **88** having a tongue **91** which extends through a slot **92** formed within the bracket **87**. The lower end of the bracket **88** is secured by a screw **93** which is threadedly received within an opening **94** formed within the bracket **87**.

A pivot plate **95** is welded to the bracket **87** by the weld projections **96** and has an annular bearing shoulder **97** which rotatably supports an annular shoulder **98** formed on the lower end of the lever **68**. A plate **100** retains the lever **68** on the shoulder **98** and has a pair of ears **101** which are received within complementary slots **102** formed within the pivot plate **95**. A screw **105** extends through a concave spring washer **106** and is threaded into an opening **108** within the bracket **87** as shown in FIG. 5 for retaining the lever **68** in friction engagement between the plates **95** and **100**. Thus by either pushing or pulling the handle **85** in a forward or rearward direction, the lever **68** rotates on the axis of the shoulder **97**.

Referring to FIG. 7, a sheath **109** encloses a movable control cable or wire **110** which is connected to the brake lever **68** at **112** so that the wire **110** is shifted within the sheath **109** when the lever **68** is pivoted. The brake actuator assembly **52** is covered by the housing **51** so that there is little danger of contact between the rider and the control wire **110** and the assembly **52**. As mentioned above, the position of the lever **68** is indicated by arrow **69** on the projection **65** of the housing **51** so that the operator knows whether the brakes are engaged or disengaged.

Referring to FIGS. 7 and 8, caliper brakes **115** are utilized in this invention and generally include L-shaped pivot arms **116** and **117** which are connected by a pivot pin **118** to a frame cross member **120** extending between the rear tube section **20***a*. A brake shoe assembly **123** is mounted on one end of each of the arms **116** and **117** and includes a block of friction material **124** which is secured in place by a conventional fastener **125**. The arms are so designed that the brake shoes move into contact with the side walls **127** of a metal rim **128** of the rear wheel **12** thereby applying friction to the rim to reduce and stop its movement.

The arms **116** and **117** are pivoted by the control wire **110** having its sheath **109** secured to an extension **130** of the arm **116** by a suitable connector **131** (FIG. 8). The wire **110** extends through the connector **131** and is connected at **132** to the end **133** of the other arm **117**. When the wire **110** is drawn into the sheath **109** by rearward movement of the actuator lever **68**, the brake shoes **123** are urged toward each other into contact with the rim **128** to create the braking action.

In operation of the invention, a person sitting on the seat **35** can easily steer the bicycle through the use of the automotive-type steering wheel **15**. Since the steering wheel **15** is round, the rider can readily control the steering operation, as for example, can easily steer with one hand and can turn the wheel through 360° for trick riding and the like. The braking operation is established by the rider reaching underneath the steering wheel **15** and moving the handle **85** of the actuating lever **68** rearwardly. Forward movement of the actuating lever **68** releases the brakes. Because there is no spring biased return on the actuating lever **68**, it can be moved rearwardly to its braking position where it is positively held by the frictional force exerted by the spring washer **106**. In this manner, the rear brakes on the bicycle **10** remain engaged so that the bicycle will not coast down a slight grade or cannot be easily pushed without first releasing the brakes by moving the lever **68** forwardly toward the front fork mast **21**.

Referring to FIG. 9 which shows the front portion of a bicycle constructed in accordance with another embodiment of the invention, a brake console or actuator **50'** includes a housing **51'** which is secured to the parallel tubes **20**. Instead of a single slot within the console **51'**, a pair of slots **66'** are provided. A pivotable brake actuating lever **68'** projects upwardly through the left slot **66'** and receives a handle **85'**, and a second pivotable lever **140** projects upwardly through the right slot **66'** and receives a handle **141**. The brake actuating lever **68'** operates in the same manner as the brake actuating lever **68** described above, that is, to brake the bicycle and form a parking brake when the handle **85'** is pulled rearwardly and to release the brake when the handle is moved forwardly.

The lever **140** is connected to move a second wire or cable **143** within a sheath **144** connected to a conventional speed change mechanism such as a chain derailer or a three-speed hub for the rear wheel. That is, by pivoting the lever **140**, the speed change mechanism is shifted between selective speed ratios and simultaneously moves a pointer adjacent a numbered face **145** for indicating the selected speed ratios.

In place of the steering wheel **15** and supporting stem **44**, the front wheel **11** is steered by a handle bar **150** which is secured to the front fork **14** by a conventional clamping arm **52**. A brake actuating handle **154** is pivotally supported adjacent the right handle grip **155** and is connected by a sheath wire **156** to the brake actuating lever **68'** so that the caliper brakes for the rear wheel may be actuated by pivoting either the lever **68'** or the lever **154**. Another actuating lever **154** is pivotally supported adjacent the left handle grip **155** and is connected by a sheath wire **157** to a caliper brake **158** mounted on the front fork **14** adjacent the rim of the front wheel **11**.

From the drawings and the above description, it is apparent that a bicycle constructed in accordance with the present invention provides desirable features and advantages. For example, the mounting of the brake actuator **50** on the twin upper tubes **20** adjacent the front fork mast **21** provides for conveniently operating the brakes for the rear wheel. This location and arrangement is especially desirable when the automotive-type steering wheel **15** is used for steering the front wheel. Furthermore, the frictional engagement of the brake actuating lever **68** between the plates **95** and **100** produced by the spring washer **106**, assures that the caliper brakes for the rear wheel will remain in either a braking condition

or a released condition. Thus when the actuating lever **68** is pulled rearwardly by the rider to brake the bicycle, the rear caliper brake will remain in a braked condition and serve as a parking brake until the actuating lever **68** is manually pivoted toward the front mast **21**.

The modification shown in FIG. 9 also provides a desirable feature. That is, the brake actuating lever **68'** is combined with a speed change shift lever **140** to provide a convenient location for both of these controls for the bicycle. It is to be understood that it is within the scope of the invention to connect the second pivotable lever **140** by a sheath wire to caliper brakes for the front wheel so that the brakes for both the front and rear wheels may be conveniently actuated by moving the levers **68'** and **140**. This arrangement might be desirable on a bicycle having an automotive-type steering wheel such as shown in FIG. 1.

The invention thus provides a novel bicycle having a steering wheel which allows increased maneuverability in combination with an actuator for caliper brakes mounted on the rear fork of the bicycle frame for engaging the rear wheel. The brakes can be locked in its engaged position to prevent the bicycle from moving without first releasing the brakes, and because the distance between the brake actuator **50** or **50'** and the brake **115** does not change or vary, less adjustment is required to compensate for changes of length of the sheath or wire.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope and spirit of the invention.

What is claimed is:

1. A cycle comprising a frame including a seat mast and a front fork mast, a pair of upper tubes connecting said front fork mast to the upper portion of said seat mast, a front fork rotatably supported by said fork mast, a front wheel mounted on said front fork, steering means mounted on said front fork for turning said front wheel, a rear wheel mounted on said frame, crank means mounted on said frame, drive means connecting said crank means to said rear wheel for propelling the cycle and including a speed change mechanism, a brake actuator supported by at least one of said tubes between said seat and front fork masts and including a first pivotable brake actuating lever projecting upwardly from said tubes, a second pivotable lever projecting upwardly from said tubes in laterally spaced relation to said first lever and connected to operate said speed change mechanism, an elongated housing mounted on said tubes covering at least a portion of said brake actuator, slot means within said housing for receiving said first and second levers, a caliper brake mounted on said frame and disposed to effect braking of said rear wheel, and means connecting said brake actuating lever to said brake for operating said brake in response to movement of said brake actuating lever.

2. A cycle comprising a frame including a seat mast and a front fork mast, a pair of upper tubes connecting said front fork mast to the upper portion of said seat mast, a front fork rotatably supported by said fork mast, a front wheel mounted on said front fork, steering means mounted on said front fork for turning said front wheel, a rear wheel mounted on said frame, crank means mounted on said frame, drive means connecting said crank means to said rear wheel for propelling the cycle, a brake actuator mounted on at least one of said tubes between said seat mast and said front fork mast and including a pivotable brake actuating lever projeuting upwardly from said tubes, a handle member mounted on the upper end of said lever, a housing mounted on said tubes covering a portion of said brake actuating lever and having a slot through which said lever projects upwardly, a caliper brake mounted on said frame and disposed to effect braking of said rear wheel, means connecting said brake actuating lever to said brake for operating said brake in response to movement of said actuating lever, and said connecting means being effective to energize said brake for gripping said rear wheel in response to manual movement of said handle member rearwardly toward said seat mast and to release said brake in response to movement of said handle toward said fork mast.

3. A cycle as defined in claim **2** including means for holding said actuating lever and said brake means in a braking condition to provide a parking brake.

4. A cycle as defined in claim **2** including means on said housing for indicating the energized and released conditions of said brake.

5. A cycle as defined in claim **2** including a second pivotable lever projecting upwardly from said housing and adapted to operate a speed change mechanism driven by said crank means.

6. A cycle comprising a frame including a seat mast and a front fork mast, a pair of upper tubes connecting said front fork mast to the upper portion of said seat mast, a front fork rotatably supported by said fork mast, a front wheel mounted on said front fork, steering means mounted on said front fork for turning said front wheel, a rear wheel mounted on said frame, crank means mounted on said frame, drive means connecting said crank means to said rear wheel for propelling the cycle, a brake actuator mounted on at least one of said tubes between said seat mast and said front fork mast and including a pivotable brake actuating lever projecting upwardly from said tubes, a handle member mounted on the upper end of said lever, a housing mounted on said tubes covering a portion of said brake actuating lever and having a slot through which said lever projects upwardly, a caliper brake mounted on said frame and disposed to effect braking of said rear wheel, means connecting said brake actuating lever to said brake for operating said brake in response to manual movement of said actuating handle member, and means for holding said brake actuating lever and said brake in an energized condition gripping said rear wheel to provide a parking brake.

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U.S. Cl. X.R.

74—501; 188—24